

Examiner Vinh is thanked for his ongoing examination of our application. Reconsideration of the rejection of all claims is respectfully requested. We wish to comment on his remarks as follows:

Overview:

Low dielectric constant films deposited by prior art methods have flat band voltages around 73 volts. The present invention teaches a process for preparing a low k film by using PECVD wherein chemical vapor deposition is enhanced by the addition of a gaseous plasma (typically helium). The novel feature of the invention is that power to the plasma is arranged to alternate between a low and a high value several times during the deposition of the film. Under these conditions, low k films having flat band voltages close to ideal (about 2 volts) are obtained. The process may be applied to the formation of dual damascene structures.

Reconsideration is requested of all rejections based on 35 U.S.C. 103:

Re claim 1, Examiner relies on Huang in view of Muruges et al., arguing that Huang teaches application of low and high bias powers to the deposition of a low k film. This argument is fallacious since bias power is power applied to the film (not the plasma) while the film deposits so that (structurally imperfect) parts of the film are preferentially removed (see col. 3 lines 16-19). Thus high bias power implies low deposition rate and

vice versa. The present invention does not use bias power at all, all applied power is to the plasma, and low power implies low deposition rate and vice versa.

Examiner further relies on Murugesh as teaching continuously depositing a low k (FSG) layers at different power levels (low and high) in a cycle until the desired film thickness is reached. This argument is fallacious as what Murugesh et al. actually teach is alternating steps of depositing the film and then heating it (while deposition is suspended) for the purpose of expelling adsorbed impurities from the film.

Re claim 8, 13 and 18, Examiner argues that "...since it is known in the art that oxide/low dielectric constant material has a flat band voltage of -1.82 V.....it would have been obvious.....to employ a low dielectric constant material having a flat band voltage that is less than about -3 V to achieve lower leakage current density.". This argument would be valid if the independent claims on which each of these claims depend were directed to a method for achieving low leakage current density. But said independent claims teach a process to form a layer of low k material, a layer of black diamond, and a damascene structure (that includes a low k film). Claims 8, 13, and 18 narrow these claims to a process to form a layer of material having a flat band voltage that is less than about -3 V. The fact that an invention teaches how to make something that can be imagined but for which there previously existed no known process for its manufacture, does not make said process obvious.

Re claim 9 and 14, Examiner relies on Cheung et al. as teaching application of low and high power to the deposition of a low k film. This argument is fallacious because two different films, in two different embodiments, are involved in Cheung's invention. Cheung use low power to deposit black diamond films and high power to deposit FSG films in separate unconnected processes. Examiner has inserted 'then' between the black diamond deposition process and the FSG deposition process to make it appear that they are parts of the same process.

Examiner further relies on Murugesh as teaching continuously depositing a low k (FSG) layers at different power levels (low and high) in a cycle until the desired film thickness is reached. This argument is fallacious as what Murugesh et al. actually teach is alternating steps of depositing the film and then heating it (while deposition is suspended) for the purpose of expelling adsorbed impurities from the film.

In conclusion, we again thank Examiner Vinh for his ongoing examination of our application. Reconsideration and withdrawal of the rejection is respectfully requested.

Allowance of all Claims is requested. It is also requested that should Examiner Vinh not find that the Claims are now Allowable, he should please call the undersigned Attorney at (845)-452-5863 to overcome any problems preventing Allowance.

Respectfully submitted

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